

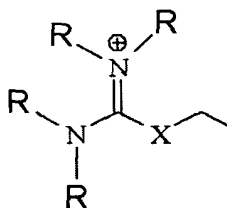
CLAIMS:

1. A compound comprising a targeting moiety bound to a leaving group, the leaving group including a site for regioselective substitution of a detectable species.

2. A compound as in claim 1 wherein the targeting moiety is selected from the group consisting of proteins, glycoproteins, lectins, peptides, polypeptides, saccharides, vitamins, steroids, steroid analogs, hormones, cofactors, nucleosides, nucleotides and polynucleotides.

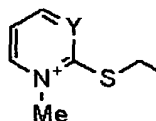
3. A compound as in claim 1 wherein the leaving group is selected from the group consisting of:

(i) groups of the formula:



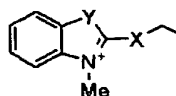
where X is S, O and R can be the same or different at each occurrence and is selected from C1 to C20 alkyl groups;

(ii) groups of the formula:



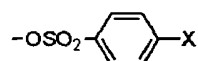
where Y is N or CH;

(iii) groups of the formula:



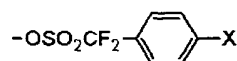
where when X is S, then Y is O or S and where when X is O, then Y is S;

(iv) groups of the formula:



where X is selected from C4 to C10 alkylene, -CN, -N+(CH3)3, or - (Q)nOCH3 where Q is C2 to C6 alkoxy and n = 1 to 6;

(v) groups of the formula:



where X is selected from C4 to C10 alkylene, -CN, -N+(CH3)3, or - (Q)nOCH3 where Q is C2 to C6 alkoxy and n = 1 to 6; and

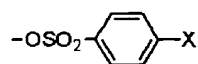
(vi) groups of the formula:



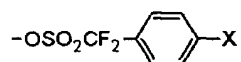
where X is selected from C4 to C10 alkylene, -CN, -N+(CH3)3, or - (Q)nOCH3 where Q is C2 to C6 alkoxy and n = 1 to 6.

4. A compound as in claim 1 wherein the leaving group is selected from the group consisting of:

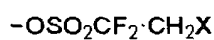
(iv) groups of the formula:



(v) groups of the formula:



(vi) groups of the formula:

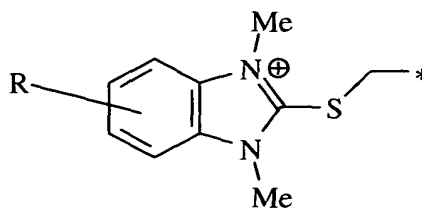
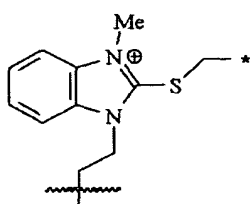
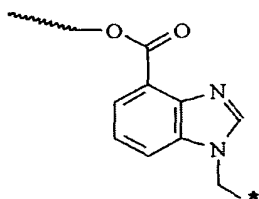


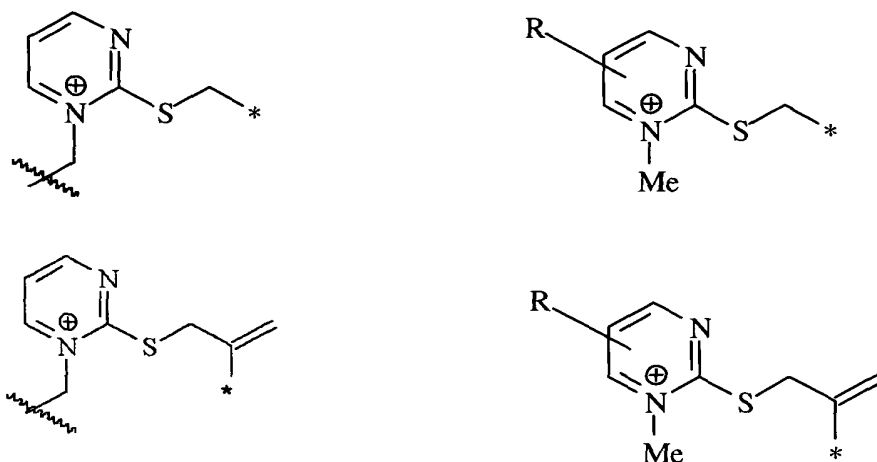
where X is selected from the group consisting of $-(\text{CH}_2)_5\text{CH}_3$, $-(\text{OCH}_2\text{CH}_2)_2\text{OCH}_3$, $-\text{CN}$ or $-\text{N}^+(\text{CH}_3)_3$.

5. A compound as in claim 1 wherein the leaving group is bound to a solid support.

6. A compound as in claim 5 wherein the solid support is selected from the group consisting of polystyrene derivatives, controlled pore glass, aluminum oxide beads, and silica beads.

7. A compound as in claim 5 wherein the leaving group bound to a solid support is selected from the group consisting of:





where * indicates the site at which the targeting moiety is located and R is a substituent which may also be used as a linker to the polymeric support.

8. A method of producing an imaging agent comprising the steps of:

providing a compound that includes a targeting moiety bound to a leaving group that contains a site for regioselective substitution of a detectable species;

contacting the compound with a solution containing the detectable species to form a reaction mixture; and

recovering the imaging agent.

9. A method as in claim 8 wherein the step of providing a compound comprises providing a compound wherein the leaving group is bound to a solid support.

10. A method as in claim 8 wherein the step of contacting the compound with a solution containing the detectable species comprises contacting the compound with a solution containing ¹⁸F.

11. A method as in claim 8 wherein the step of recovering the imaging agent comprises passing the reaction mixture through a short plug solid-phase media.

12. A kit comprising:

a first container having therein a solution containing a detectable species; and

a second container having therein a compound that includes a targeting moiety bound to a support via a leaving group that contains a site for regioselective substitution of the detectable species.

13. A method comprising:

contacting a compound that includes a targeting moiety bound to a leaving group that contains a site for regioselective substitution of a detectable species with a solution containing the detectable species to form a reaction mixture;

recovering the detectable species; and

administering the detectable species to a subject.

14. A method as in claim 13 wherein the detectable species is ^{18}F .

15. A method as in claim 13 further comprising the steps of detecting the detectable species and generating an image.